

Nanocellulose from biomasses for innovative applications

Elena FORTUNATI

The need to both avoid wastes and find new renewable resources has led to a new and promising research based on the possibility to revalorize the biomass producing sustainable chemicals and/or materials which may play a major role in replacing systems traditionally obtained from non-renewable sources. Most of the low-value biomass is termed lignocellulosic, referring to its main constituent biopolymers: cellulose, hemicelluloses and lignin. In this context, nanocellulose, and in particular cellulose nanocrystals (CNC), have gain considerable attention as nanoreinforcement for polymer matrices, mainly biodegradable. Derived from the most abundant polymeric resource in nature and with inherent biodegradability, nanocellulose is an interesting nanofiller for the development of nanocomposites for industrial, biomedical and agricultural applications. Due to the high amount of hydroxyl groups on their surface, cellulose nanocrystals are easy to functionalize. Well dispersed CNC are able, in fact, to enhance several properties of polymers, i.e.: thermal, mechanical, barrier, surface wettability, controlled of active compound and/or drug release. The main objective here is to give a general overview of CNC applications, summarizing some developments of bio-based nanocomposite formulations reinforced with cellulose nanocrystals extracted from different natural sources and/or wastes for food packaging, medical and agricultural sectors.